NSF
Biomass-related Research Activities

Prepared for:

Biomass R&D Board
for presentation to the
Biomass R&D Technical Advisory Committee

Presented by:
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Bioengineering and Environmental Systems
NSF

February 24, 2003

Overview

- **NSF Mission: Advance the frontiers of science and engineering through support of research and education**

- **Major biomass-related research grant areas:**
  - Biomass Engineering and Biotechnology
  - Metabolic Engineering (Interagency)
  - Technology for a Sustainable Environment (with EPA)
  - Integrative Plant Biology
  - Ecological and Evolutionary Physiology
  - Plant Genome Research
  - Project 2010 (A*rabidopsis* functional genomics)

Directorates/Divisions/Programs supporting Biomass-related activities

Engineering Directorate (ENG):

- **Bioengineering and Environmental Systems Division (BES):** Examples- Biochemical Engineering Program, Biotechnology Program, Environmental Engineering and Technology Programs
- **Chemical and Transport Systems Division (CTS)**
- **SBIR/STTR**

Biological Sciences Directorate (BIO):

- **Integrative Biology & Neuroscience Division (IBN):** Examples- Integrative Plant Biology Program, Ecological and Evolutionary Physiology Program
- **Biological Infrastructure Division (DBI):** Examples - Plant Genome Research Program, Project 2010 (A*rabidopsis* functional genomics) Program

Other Directorates (e.g., Mathematical & Physical Science)

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

<u>"Biochemical and Biomass Engineering and Biotechnology"</u>

- **Summary -** Addresses problems involved in economic processing and manufacturing of products by effectively using renewable resources.

  Example grant: "Metabolic Engineering, Optimization and Control of Ethanol Production in Escherichia coli" (Ramkrishna, Purdue).

- **Funding –** Approximately $15 million per year for all subjects.

- **Program Contact –** Fred Heineken, 703-292-8320

Metabolic Engineering

- **Explicitly cited as an area for research support in the Biomass Research and Development Act of 2000**
- **Sec. 307. Biomass Research and Development Initiative:**

(d) Uses of Grants, Contracts, and Assistance

(2) research on technologies

(A) metabolic engineering of biological systems...to produce novel products, especially commodity products, or to increase product selectivity and tolerance, with a research priority for the development of biobased industrial products that can compete in cost and performance with fossil-based products

Interagency Announcement of Opportunities in Metabolic Engineering

FY 2003

Program Solicitation
NSF 03-516
Replaces Document nsf02037

National Science Foundation
Directorate for Engineering
Division of Bioengineering and Environmental Systems
Directorate for Biological Sciences
Division of Molecular and Cellular Biosciences
Division of Integrative Biology and Neuroscience

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Activities related to Biotechnology and Plant Physiology (and Bioconversion)

<u>"Technology for a Sustainable Environment (TSE, with EPA)"</u>

- **Summary -** Funds fundamental and applied research in the physical and biological sciences and engineering that will lead to environmentally-benign methods for industrial processing/ manu-facturing.

  Example grant: "Biological hydrogen production as a sustainable green technology for pollution prevention" (Logan, PA State U).

- **Funding –** Approximately $6 million per year at NSF for all subjects.

- **Program Contact –** Tom Waite, 703-292-7499

2003 Environmental Technologies and Systems

NSF/EPA PARTNERSHIP FOR ENVIRONMENTAL RESEARCH

Program Solicitation
NSF 03-510
Replaces Document NSF 01-76

National Science Foundation
Directorate for Engineering
Directorate for Mathematical and Physical Sciences

Environmental Protection Agency

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

February 25, 2003
Technology for a Sustainable Environment (TSE)

March 04, 2003
New Technologies for the Environment (NTE)

February 24, 2003

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

<u>"Materials Use: Science, Engineering, and Society (MUSES)"</u>

- **Summary -** Funds research on understanding the supply, treatment, use, and reuse of resources provided by natural systems as well as the environmental effects of introducing alternative materials or new processes.

  Example grant: "Developing Methods of Defining Sustainable Uses for Agricultural Products " (Anex, U. of Oklahoma).

- **Funding –** Approximately $5 million per year for all subjects.

- **Program Contact –** Delcie Durham, 703-292-8320

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

“Plant Genome Research Program”

- **Summary -** Supports research on plant genomics and on accelerating the acquisition and utilization of new knowledge and innovative approaches to the analysis of fundamental biological processes in plants. Focuses on plants of economic importance and plant processes of potential economic value.

  Example award: “Consortium for Maize Genomics” (Schubert, Danforth Plant Science Center).

- **Funding –** Approximately $13 million per year.

- **Program Contact –** Jane Silverthorne, 703-292-8470

Microbial Genome Sequencing Program

Program Solicitation
NSF 03-526

National Science Foundation
Division of Molecular and Cellular Biosciences

U.S. Dept. of Agriculture

Letter of Intent Due Date(s) ***(optional):***

February 18, 2003

Full Proposal Deadline(s) (due by 5 p.m proposer's local time):

April 17, 2003

February 24, 2003

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

“2010 Project *(Arabidopsis* Functional Genomics)*”*

- **Summary -** Objective is to determine the function of all genes in the model plant *Arabidopsis thaliana* by the year 2010. Using this model plant, researchers can map out metabolic pathways that can improve plant growth in economically important crop species.

  Example award: “Coordination of Multinational A*rabidopsis* Functional Genomics Research” (Sussman, U. of Wisc.-Madison).

- **Funding –** Approximately $3 million per year.

- **Program Contact –** Machi Dilworth, 703-292-8470

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

“Integrative Plant Biology”

- **Summary -** Supports research on plants as functional units, integrating molecular, biochemical, and biophysical approaches to the understanding of plant form and function. Examples include work on cell wall structure and chemical transport.

  Example grant: “ Role of Amino Acid Transporters in Seed Development” (Tegeder – Washington State U.).

- **Funding –** Approximately $0.3 million per year for research on cell wall structure and chemical transport.

- **Program Contact –** Stephen Herbert, 703-292-8421

Activities related to Biotechnology and Plant Physiology (and Bioconversion)

<u>"Ecological and Evolutionary Physiology"</u>

- **Summary -** Supports research that addresses ecological or evolutionary questions in the areas of morphology, comparative physiology, physiological ecology and biomechanics of plants, animals, protists, fungi and bacteria. Includes grants that focus on plant biochemistry, including carbon cycling and stress tolerance.

  Example grant: "Collaborative Research: Linking Xylem Functional Traits to Life History Type in California Chaparral." (Ewers – Michigan State U.)

- **Funding –** Approximately $0.6 million per year for research on plant biochemistry.

- **Program Contact –** William Zamer, 703-292-8421

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Activities related to Biotechnology and Plant Physiology (and Bioconversion)

“SBIR/STTR Biotechnology Programs”

- **Summary -** Supports biotechnology research at small businesses. Subtopics include agricultural and food biotechnology and biomass processing.

  Example grant: “Engineering Broad Spectrum Disease Resistance in Crop Plants” (Heard, Mendel Biotech Inc.)

- **Funding –** Approximately $10 million per year for all SBIR/STTR biotechnology subtopics.

- **Program Contact –** Om Sahai, 703-292-7795

Activities related to Agronomic Practices, other Roadmap Categories

None Additional

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NSF web address

www.nsf.gov

(lists all program descriptions, program announcements, solicitations, grant summaries, and contacts)

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